DOCUMENT RESUME

ED 271 312 SE 046 666

AUTHOR Takats, Martha C.
TITLE Writing Your Own Interactive Software for the Macintosh.
PUB DATE Dec 85
NOTE 12p.; For further information about the program described in this document, contact Martha C. Takats, Ursinus College, Collegeville, PA 19426.
PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Science; *Computer Graphics; *Computers; Computer Science Education; Higher Education; *Physics; *Programing; Science Education; Secondary Education; Secondary School Science
IDENTIFIERS *Apple Macintosh; *Basic Programing Language

ABSTRACT

This paper describes Macintosh features which can be used in writing interactive programs. A program written in Microsoft BASIC (version 2.0 interpreter) is described which is used to produce plots of electric field produced by two-dimensional arrangements of point charges. It demonstrates the use of pull-down menus, windows on the screen, the mouse, and buttons to make the program highly interactive. Actual screen graphics are included, but no program code is included. (JM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED271312

Writing Your Own Interactive Software for the Macintosh

Martha C. Takats
Ursinus College, Collegeville, PA 19426

This paper describes some of the Macintosh™ features which can be used in writing interactive programs. The program illustrated, written in Microsoft™ BASIC (version 2.0 interpreter), is used to produce plots of electric fields produced by two-dimensional arrangements of point charges. The program allows the user to specify the charge distribution and to select the type of plot to be made. All interaction is graphical.

The features which make the Macintosh user interface so convenient include windows on the screen, the use of the mouse (as opposed to the keyboard) for input, pull-down menus, and buttons.

The author of a program specifies titles, sizes, and locations of windows, whether or not they are visible on the screen, and which window is active at any time during the program.

The program is written to accept graphical input by means of the mouse. A cursor appears on the screen, controlled by motion of the mouse, to give visual feedback to the user. Functions available to the programmer indicate whether or not the mouse button has been pressed. It is possible to define a new cursor to replace the usual arrow. In the program described, all interaction takes place with the mouse.

Menus provide the user with a means of selecting different functions during execution of a program. The titles appear at the top of the screen and may be "pulled down" by the mouse. A BASIC program may add its own menu or menus to those provided by the interpreter.

A button which is drawn on the screen is "pressed" by moving the cursor to the button and clicking the button on the mouse; BASIC functions indicate which screen button has been selected in this way.

The following pages describe menus and buttons in more detail and illustrate the use of the various Macintosh features in the field plotting program.

SE 046 666

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

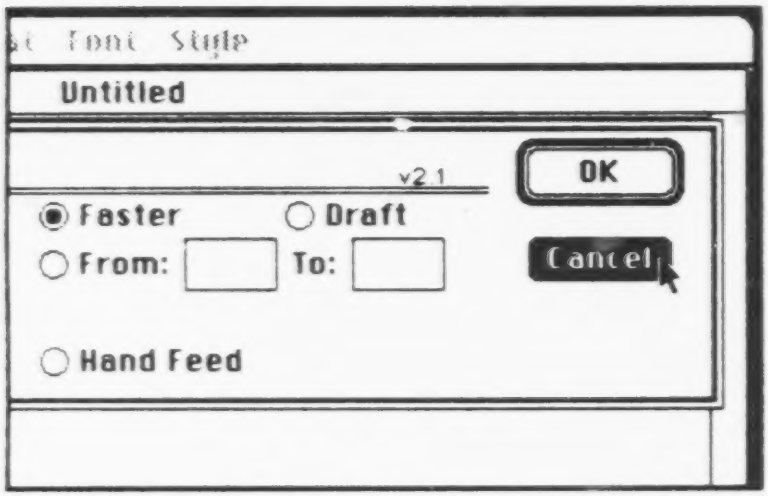
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

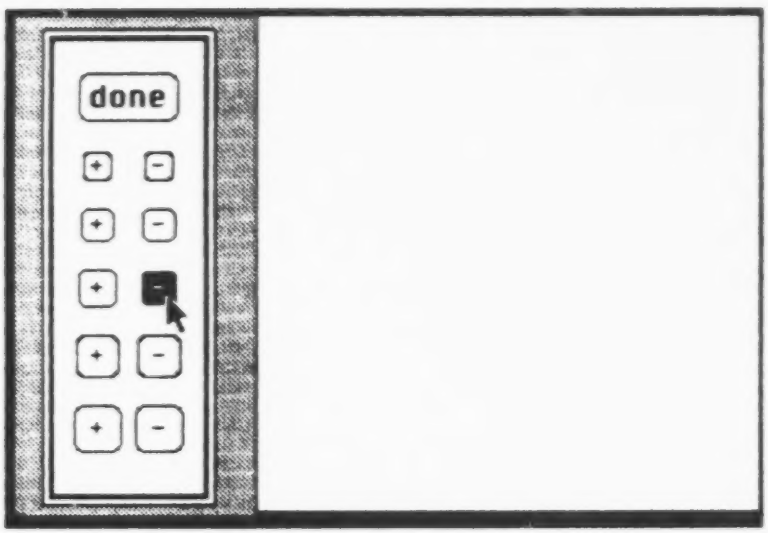
"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Martha C. Takats

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BUTTONS



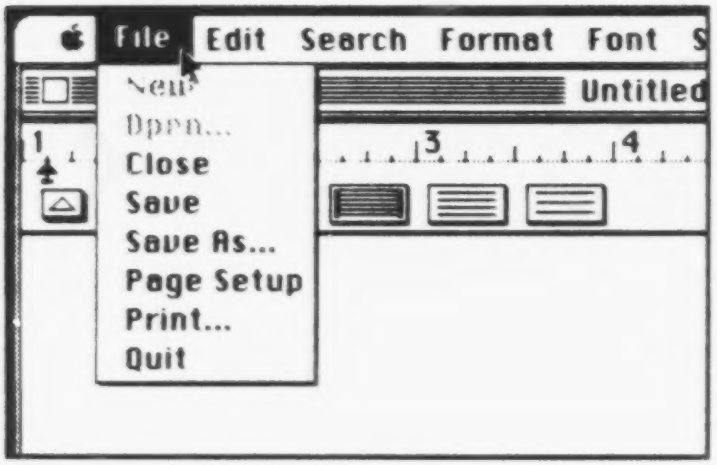
Portion of MacWrite™ screen showing a dialog box with several buttons. In this example, the button labeled "Cancel" is being selected.



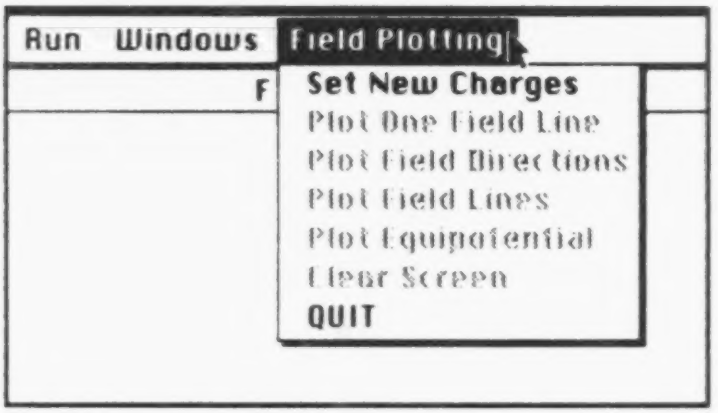
Window containing eleven buttons for use in the BASIC program which plots electric field lines. The buttons are used to select the sign and size of the electrical charges which are to produce electric fields.

The buttons shown in the BASIC program are of the same type as those at the right in the MacWrite™ example. These buttons may be specified to be any size, and may contain text. Functions in the BASIC language make it possible to determine which button has been selected.

MENUS



Portion of MacWrite™ screen showing menu

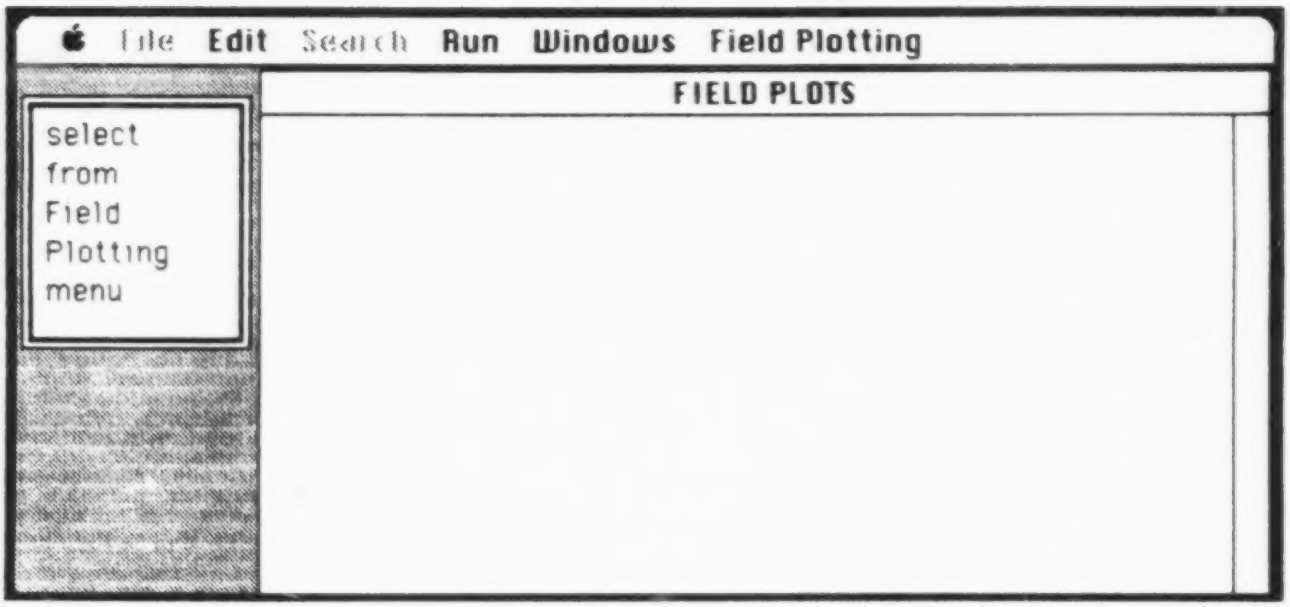


Menu used to control BASIC program to plot electric field lines

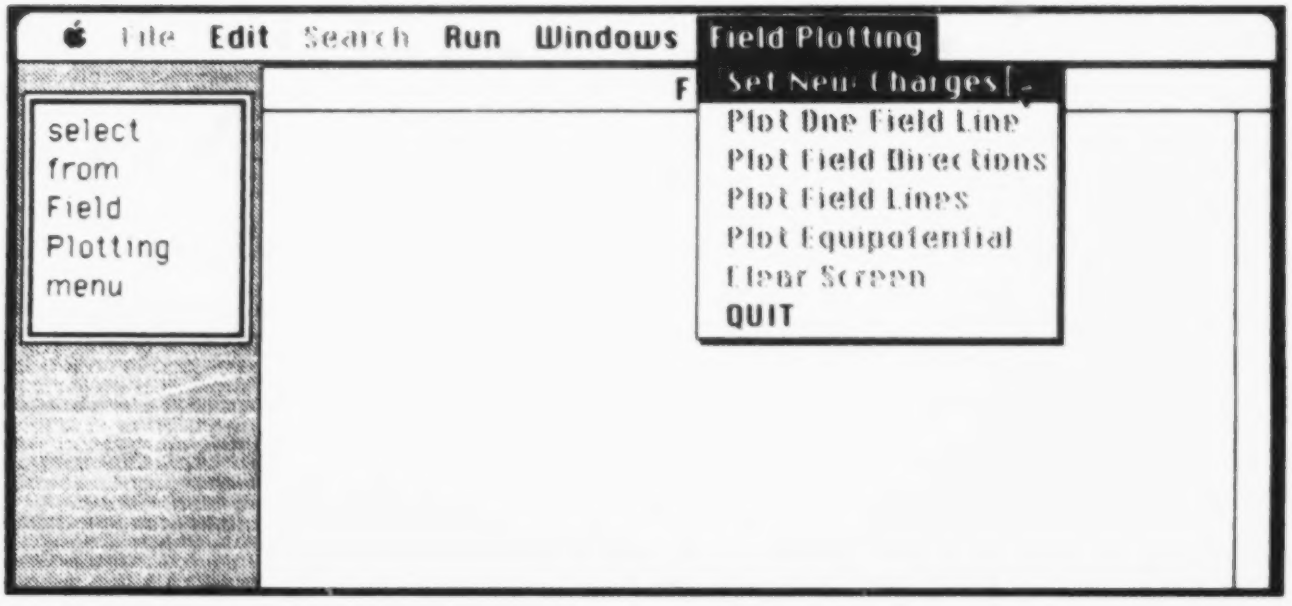
Menus, with titles appearing across the top of the screen, are generally available to the user of a program or application during its execution.

After the user is finished with a particular menu, the material which was temporarily hidden reappears, that is, the menu is nondestructive to text or graphics underneath.

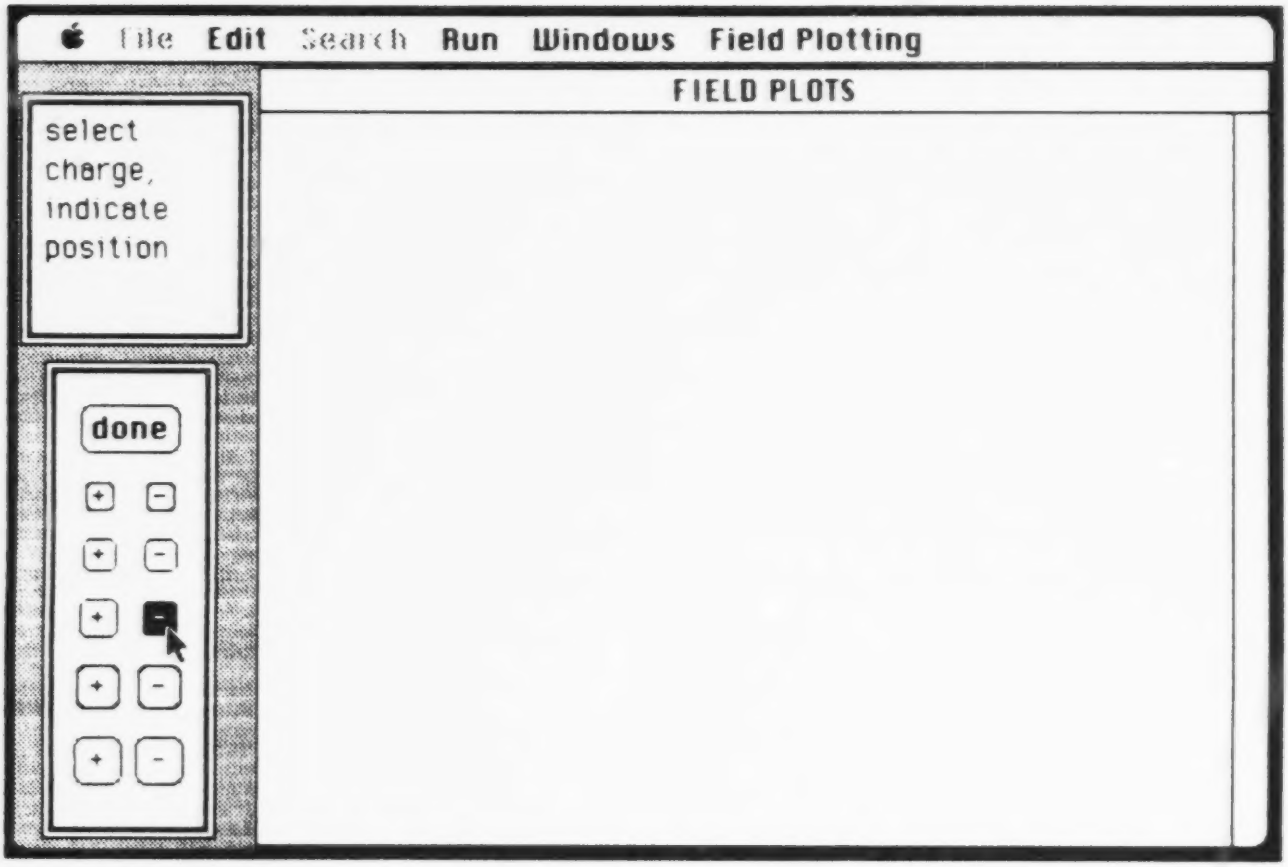
Some items on a menu can be disabled temporarily. These are shown in grey rather than black in the menu.



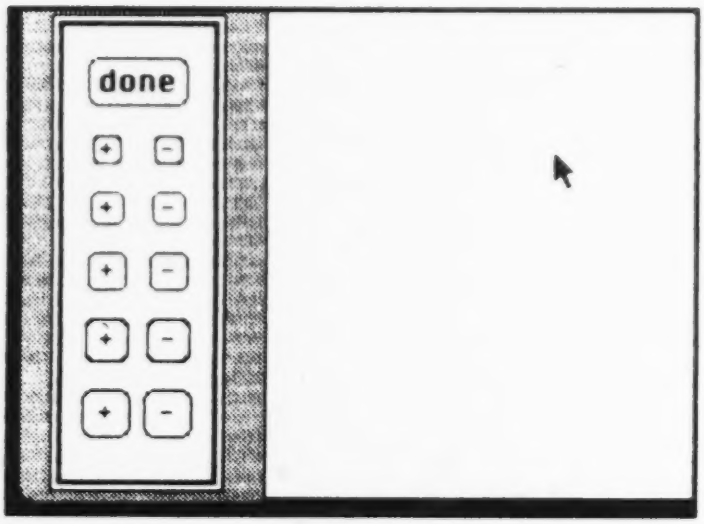
Appearance of the screen at the start of the Field Plotting program. Two windows, are visible, the main output window for plotting, and a smaller window for instructions



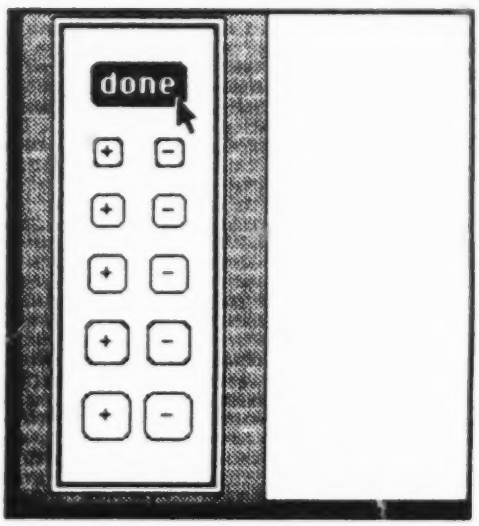
The Field Plotting menu has been pulled down. Note that only two of the seven possible choices are currently available. The choice being made is "Set New Charges"



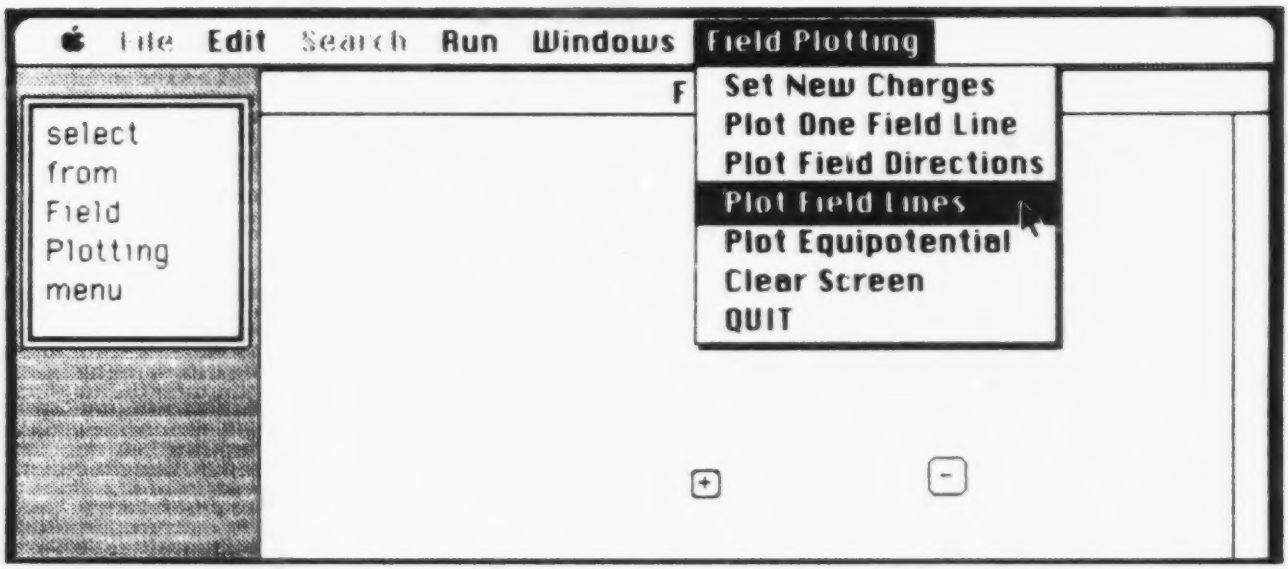
A third window has been added to the screen, containing buttons which will be used to set up a distribution of point charges.



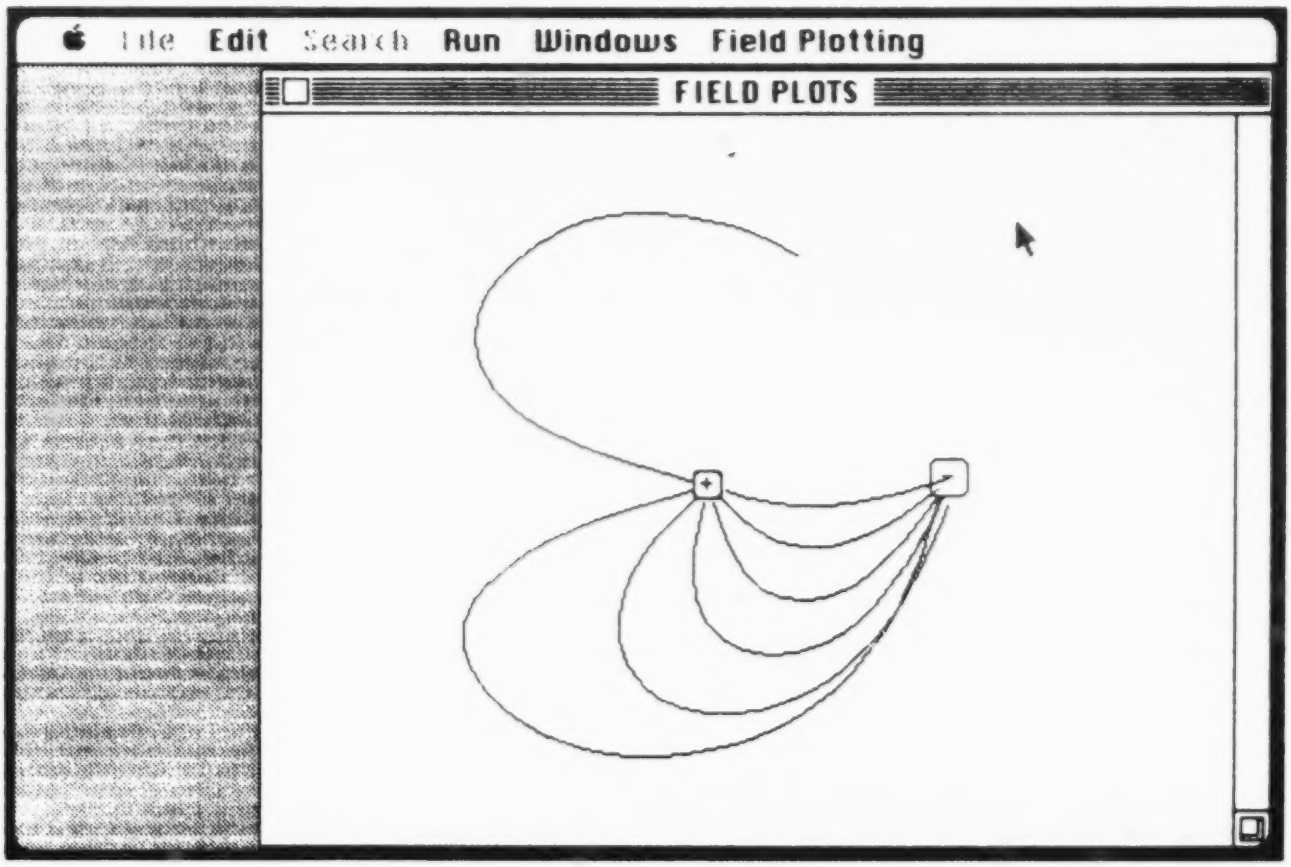
The cursor (arrow) is used to select the location of the point charge in the field plotting window.



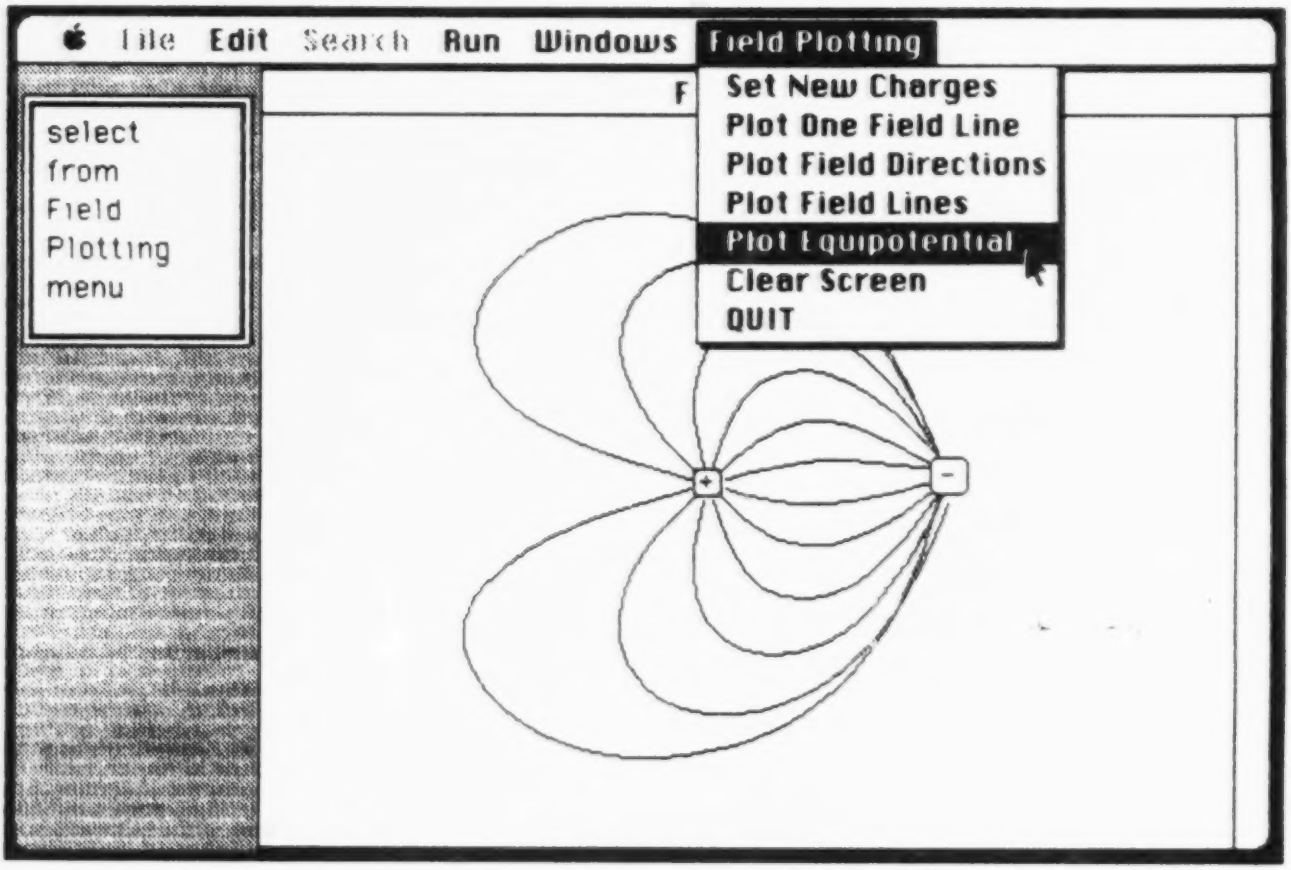
Selecting "done" indicates that the charge distribution is completed.



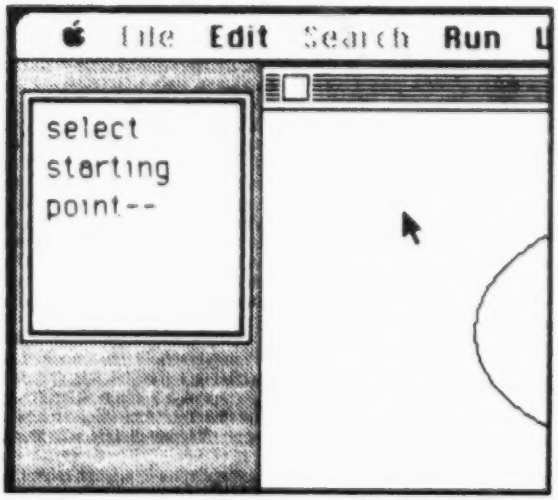
After the charge distribution has been specified, all options on the field plotting menu are available.

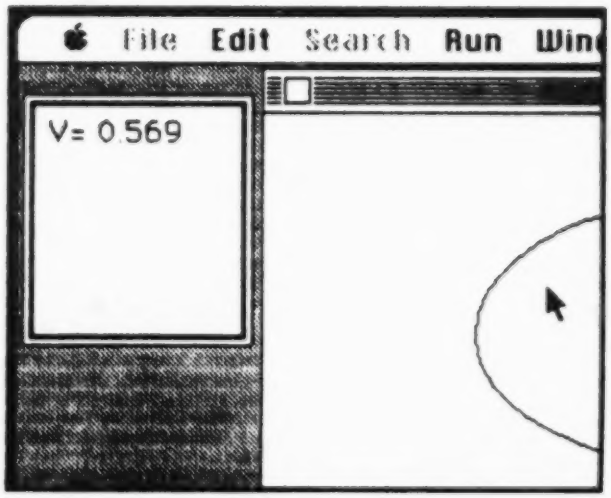


When the "Plot Field Lines" option is selected, the computer produces the requested plot.

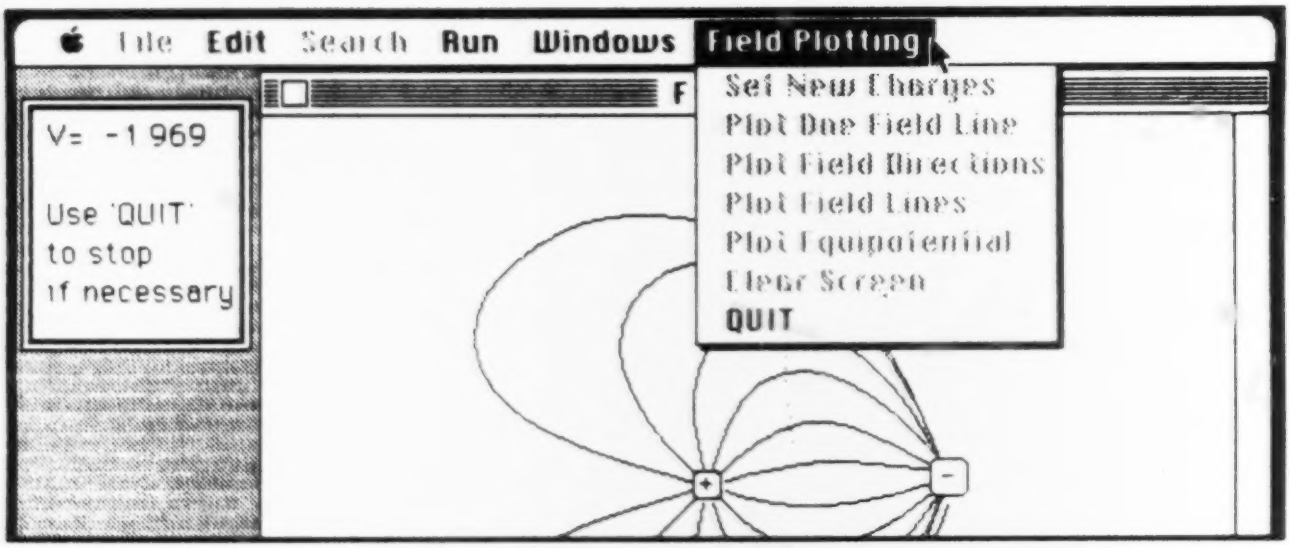


After the field lines have been plotted, the next selection is made.

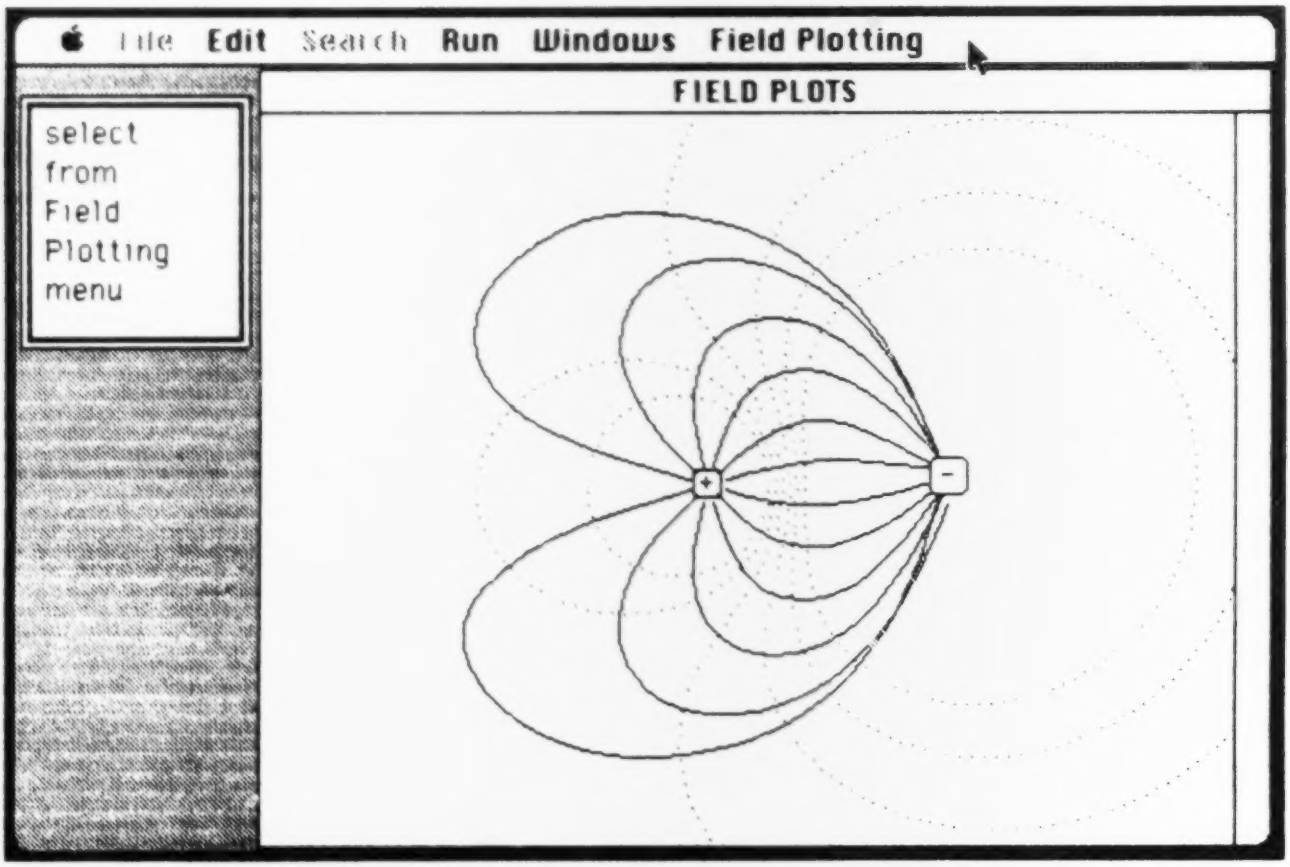




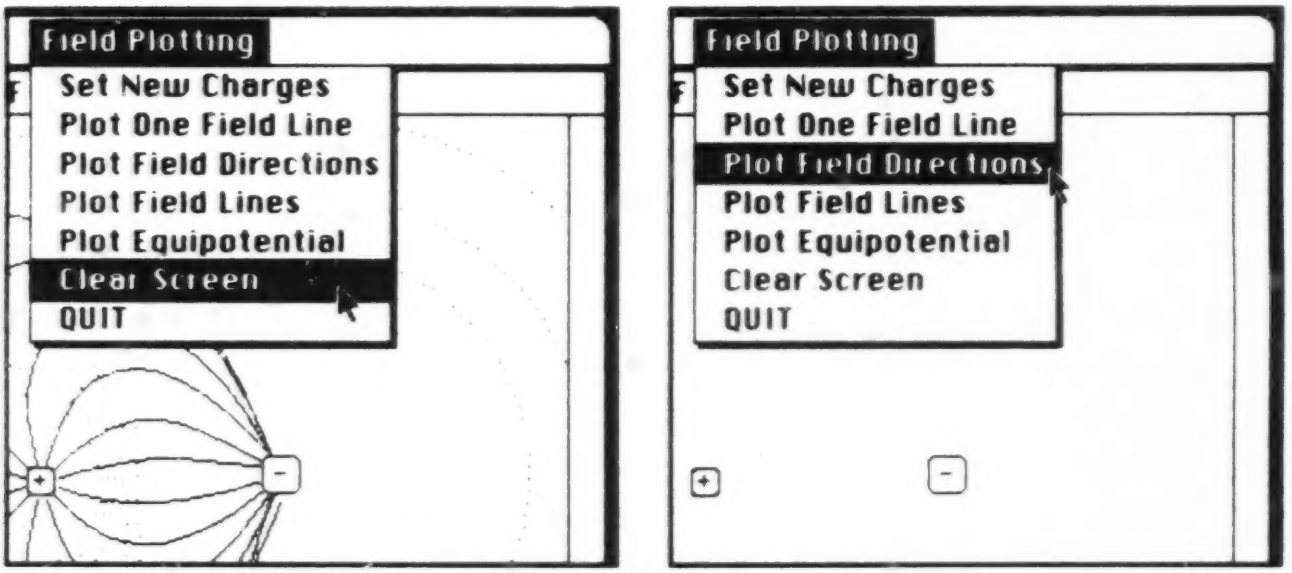
The cursor is used to select the starting point for each equipotential line. As the mouse is dragged, the potential at the location of the cursor is printed in the information window. When the button is released, plotting begins.



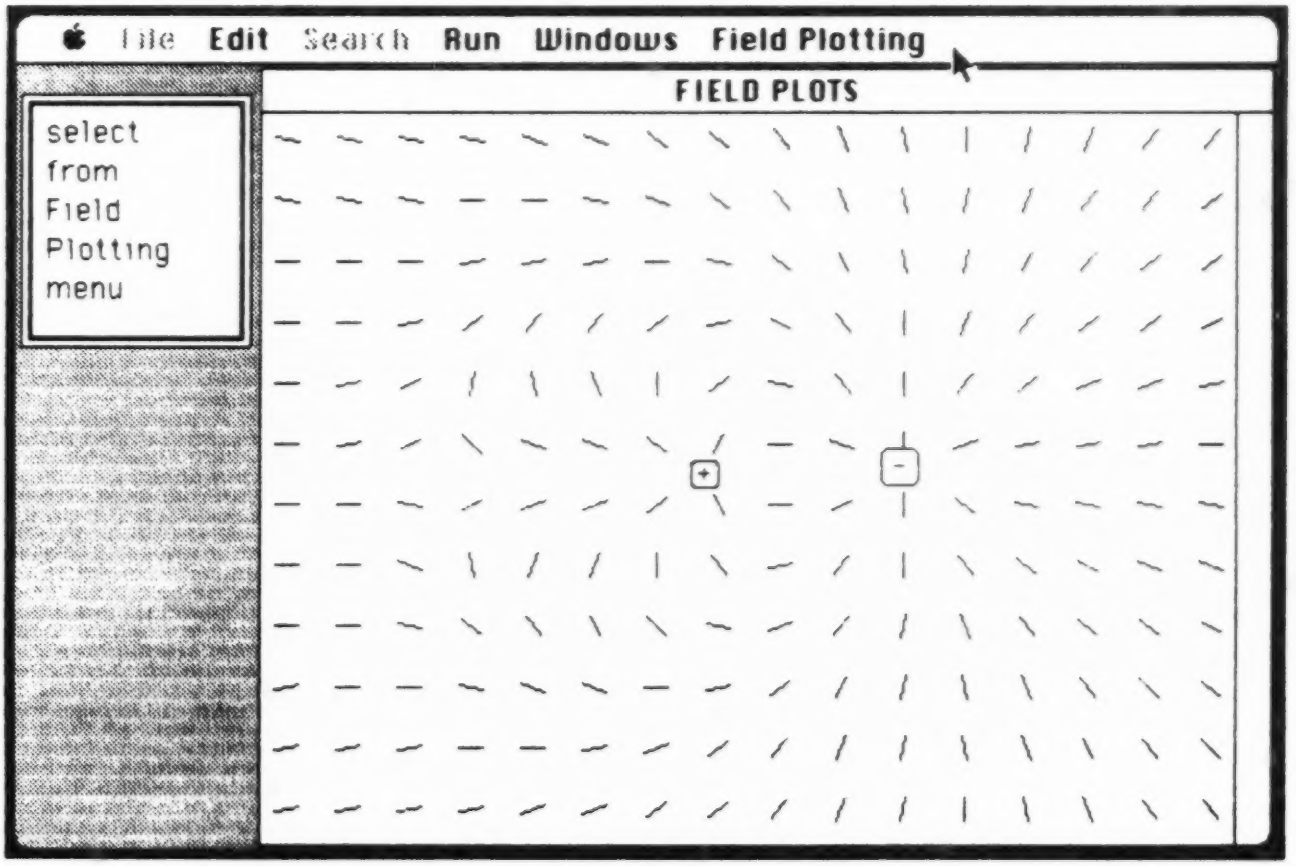
While the equipotential line is being plotted, it may by stopped by choosing "QUIT" (the only option which is not disabled) from the Field Plotting menu.



Several equipotential lines have been plotted, the computer now waits for further instructions.



The screen is cleared before another plot is made. The distribution of point charges remains on the screen until new charges are set.



In this plot, the short lines indicate the direction of the electric field at each point.

The program which is described here may be compared with similar programs written to run on the Apple II computer.

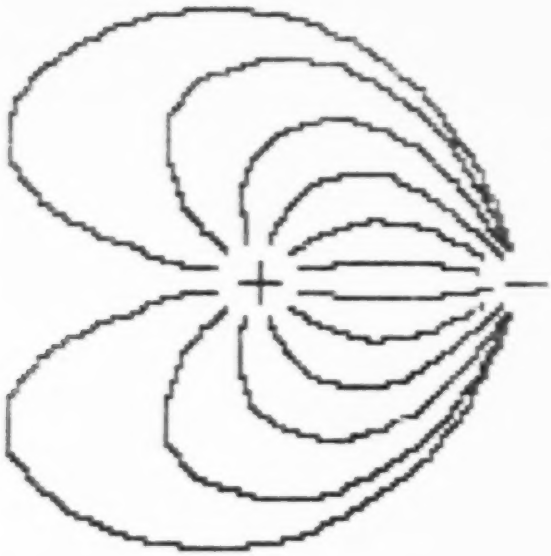
Graphical input is possible with the Apple II, either by attaching a device (game paddles, joystick, or mouse) to the game port, or by using the keyboard to move a cursor around on the screen. Functions for reading the input and displaying the cursor must be written by the programmer. There are no built-in functions for menus or multiple windows; these too must be provided by the programmer. With the Macintosh, familiarity with the operating environment from other applications may make the interaction easier for the user to learn.

Resolution on the Macintosh screen is somewhat better than on the Apple II. On the next page, a screen dump from an Applesoft program is compared with one from the Macintosh program. The part of the Apple II screen used had a resolution of 280 x 160 pixels; the Macintosh window used for plotting had a resolution of 410 x 300 pixels.

The time required to generate a plot of field lines depends on its complexity and increases with the number of charges shown. The Macintosh plot on the next page took approximately 65 seconds to generate, the Applesoft plot approximately 190 seconds. A similar program written in Apple Pascal, in which the program was compiled rather than interpreted, produced an equivalent plot in 55 seconds. By using a compiler (such as Pascal) on the Macintosh, it should be possible reduce the time for this plot to much less than a minute.

Any programming language for the Macintosh must be purchased separately; unlike the Apple II, the Macintosh does not have a built-in BASIC interpreter. The program described here requires an interpreter to run; it is not a stand-alone (double clickable) application. A compiled program, however, may be run without further access to the language.

BEST COPY AVAILABLE



E FIELD LINES V EQUIPOTENTIAL

N NEW CHARGES C CLEAR Q QUIT